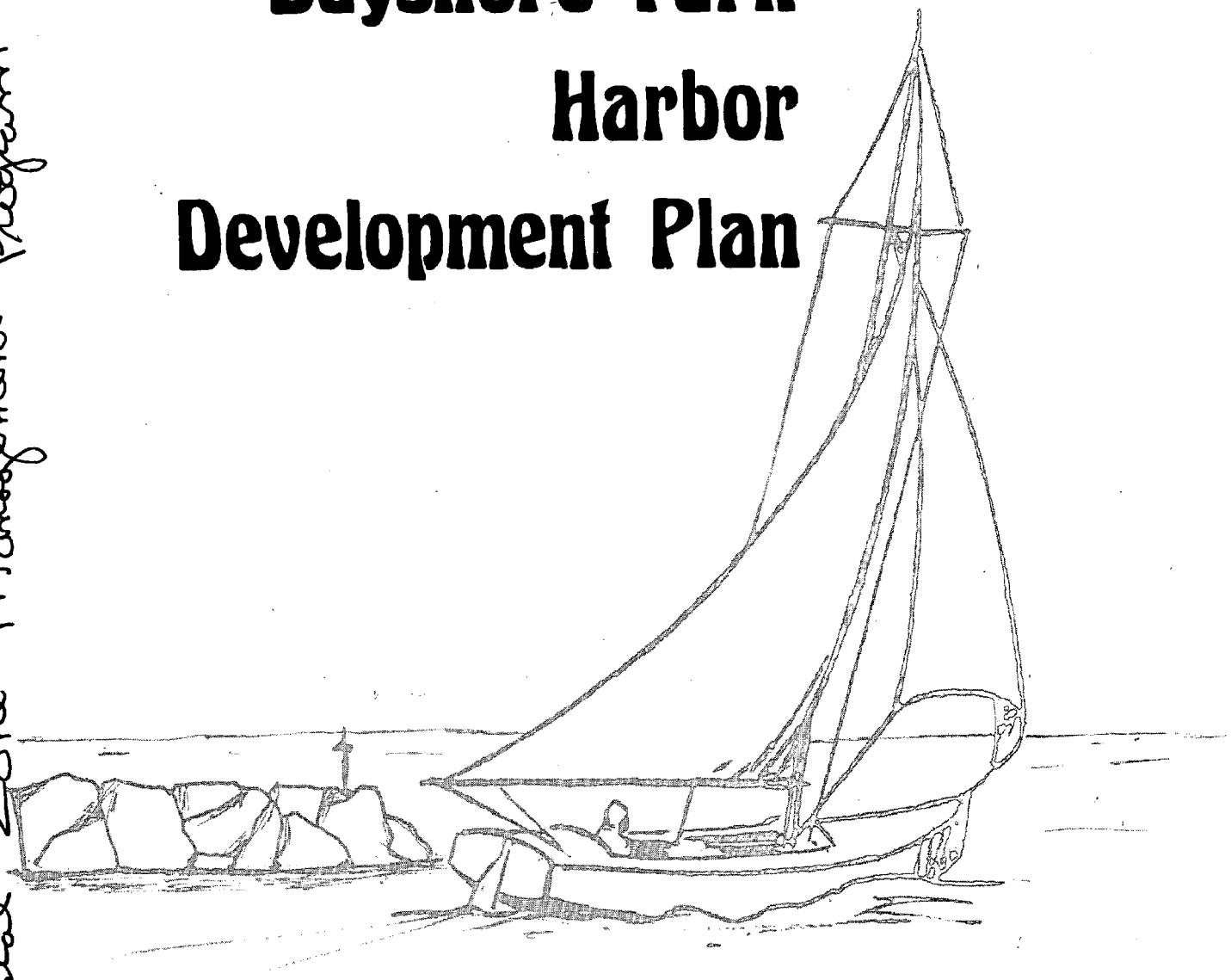
Bayshore Park Harbor Development Plan



Brown County, Wisconsin

1981

OWEN AYRES & ASSOCIATES INC

SECTIONS

BAYSHORE PARK
HARBOR DEVELOPMENT PLAN

BROWN COUNTY, WISCONSIN

April 1981

The preparation of this plan is the direct result of efforts by the Brown County Park Commission. Brown County has commissioned this plan in the interest of providing quality recreational opportunities for its residents and visitors.

Financial assistance has been provided by the State of Wisconsin, Department of Administration, Office of State Planning and Energy and the Coastal Zone Management Act of 1972, as amended, administered by the Office of Coastal Zone Management, National Oceanic Atmospheric Administration.

Brown County has been assisted by: OWEN AYRES & ASSOCIATES INC
1789 Shawano Avenue
Green Bay, WI 54303

Project Engineer - Vern Vandenberg
Project Planner - Peter Staks

SECTION I

Introduction

This report has been prepared as a guide to the ultimate design of the Bayshore Park harbor and related facilities. The suggestions and designs in this plan are advisory in nature, and provide a development goal, whereby interim activities can be consistent with longer range planning.

The plan objectives are to:

1. assess the level of boater demand for expanded water related facilities at Bayshore Park.
2. identify the type, extent and estimated cost of harbor facilities that are to be incorporated in the final harbor development.
3. define the role that Brown County could assume in satisfying boater needs at the Bayshore Park facility.
4. set forth a schedule of improvements.

Location

Bayshore is located in the Town of Green Bay on the East shore of the Bay of Green Bay in the extreme northeast corner of Brown County. State Highway 57 serves as the major traffic artery extending from the major population centers within the county. Via This route, the City of Sturgeon Bay is 24 miles to the north, and the City of Green Bay is 17 miles to the south. (See Figure 1).

The shoreline has a northern exposure with little natural harbor protection existing in the vicinity of Bayshore Park. The nearest public harbor of refuge is at the mouth of the Fox River in Green Bay approximately 12 miles to the south.

BAYSHORE PARK REGIONAL LOCATION

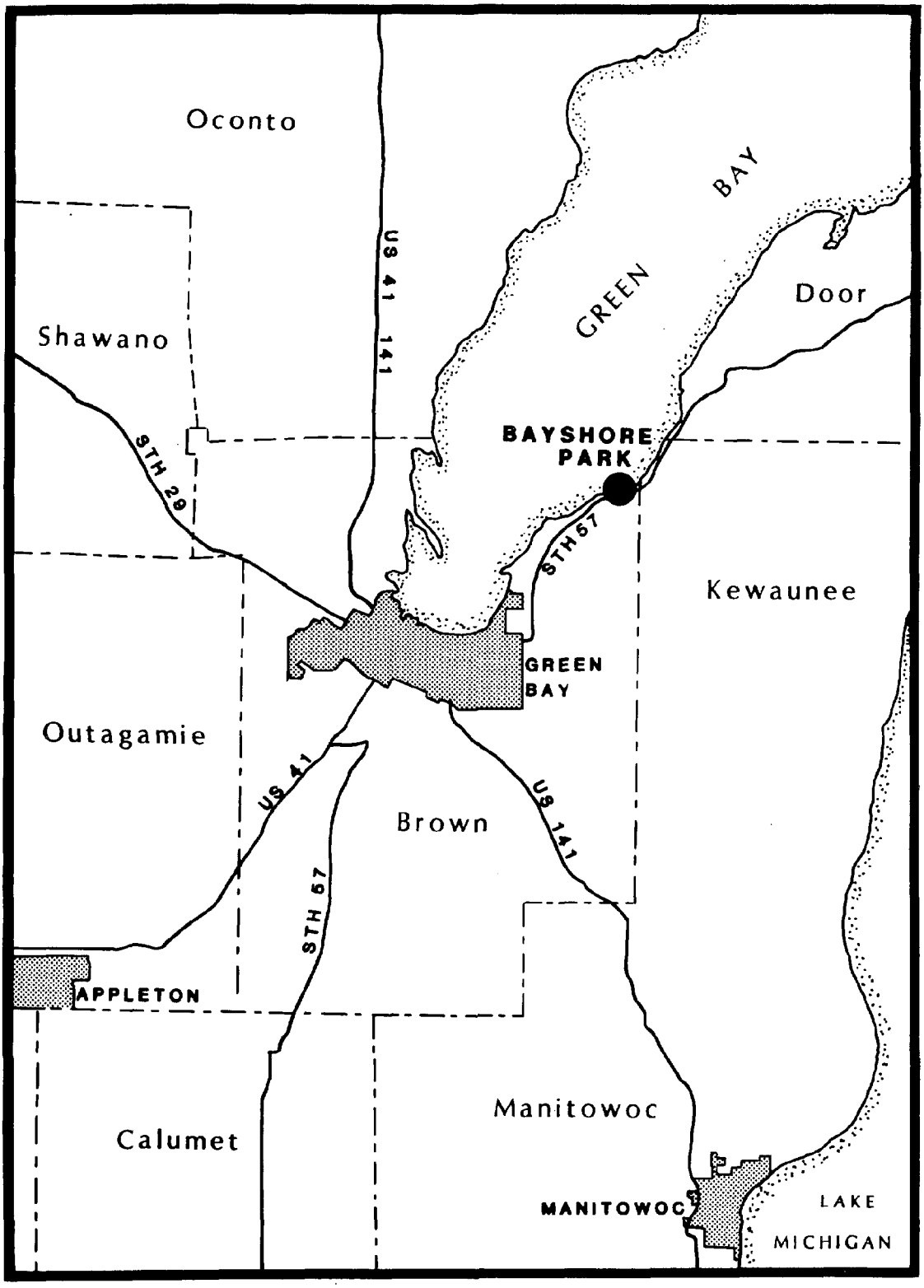


Figure 1

SECTION II

Existing Conditions

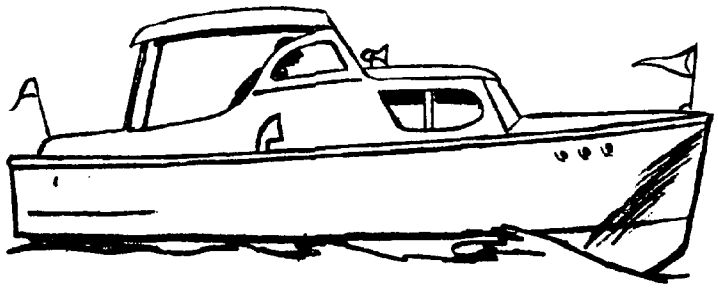
Existing Use of the Bayshore Park

Little data has been systematically gathered or recorded regarding the activities of boating and harbor use at Bayshore Park to date. However, based on the experiences and observations of park personnel, a reasonably accurate estimate of harbor utilization can be provided.

Since its construction, park personnel estimate that there are an average of about 360 boat launches per week starting in mid-May and ending in mid-October, or approximately 7,200 launchings per season. On at least five occasions in 1979, the entire parking area at the shoreline was filled to capacity with cars and boat trailers making it necessary to restrict further entry of vehicles and to close the access road. Since the parking lot holds a maximum of about 70 cars and trailer units, a minimum of that many launches occurred at those times. Overflow parking can (and has) been accomodated at the top of the access road when the parking facility has been full.

During times of favorable weather and holidays, as many as 400 launches per week are estimated to occur. This would average almost 60 launches per day.

It is estimated that of the boats launched at Bayshore Park, approximately half are used for fishing, while the others partake in cruising, water skiing, sailing or other recreational activities.



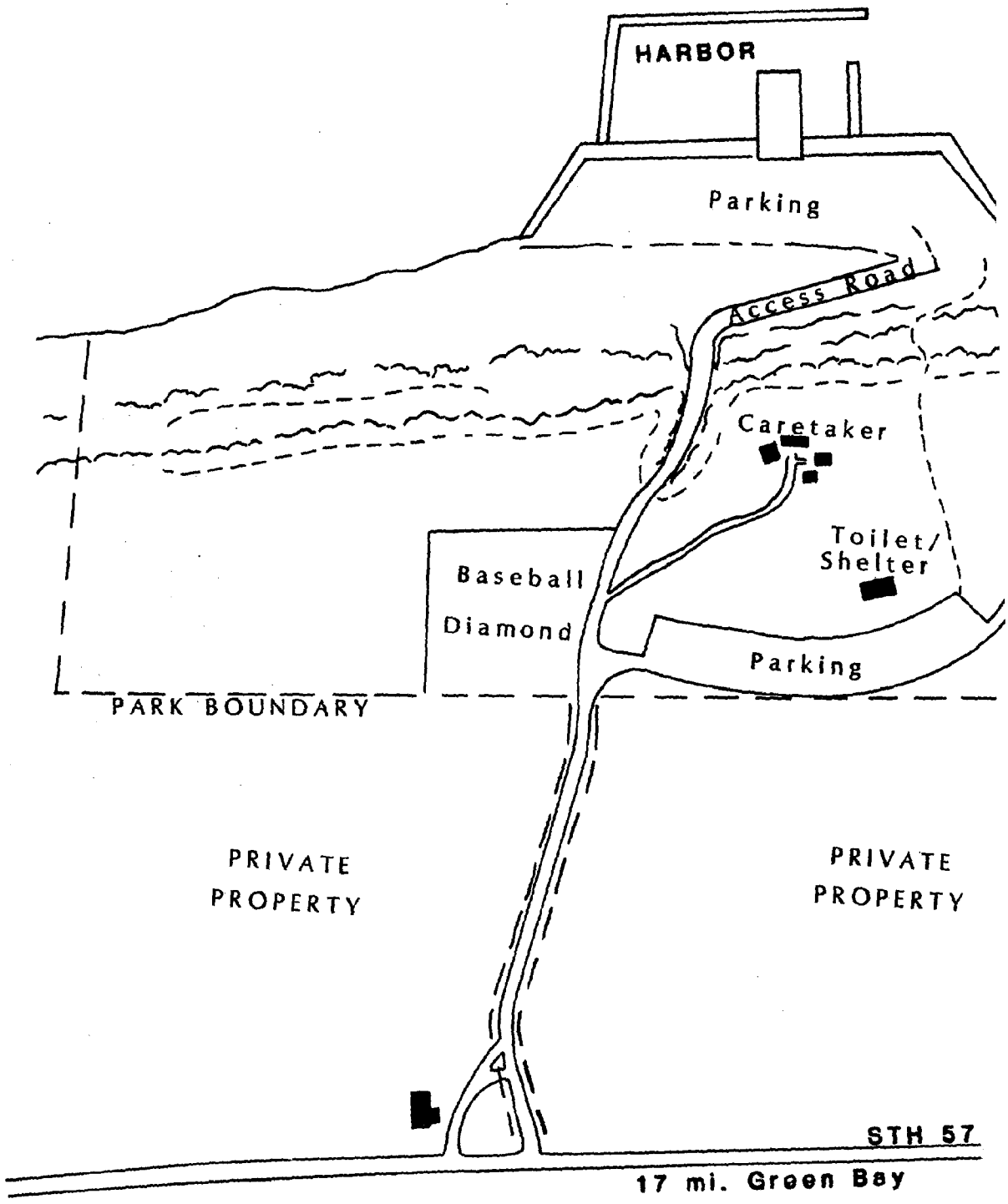
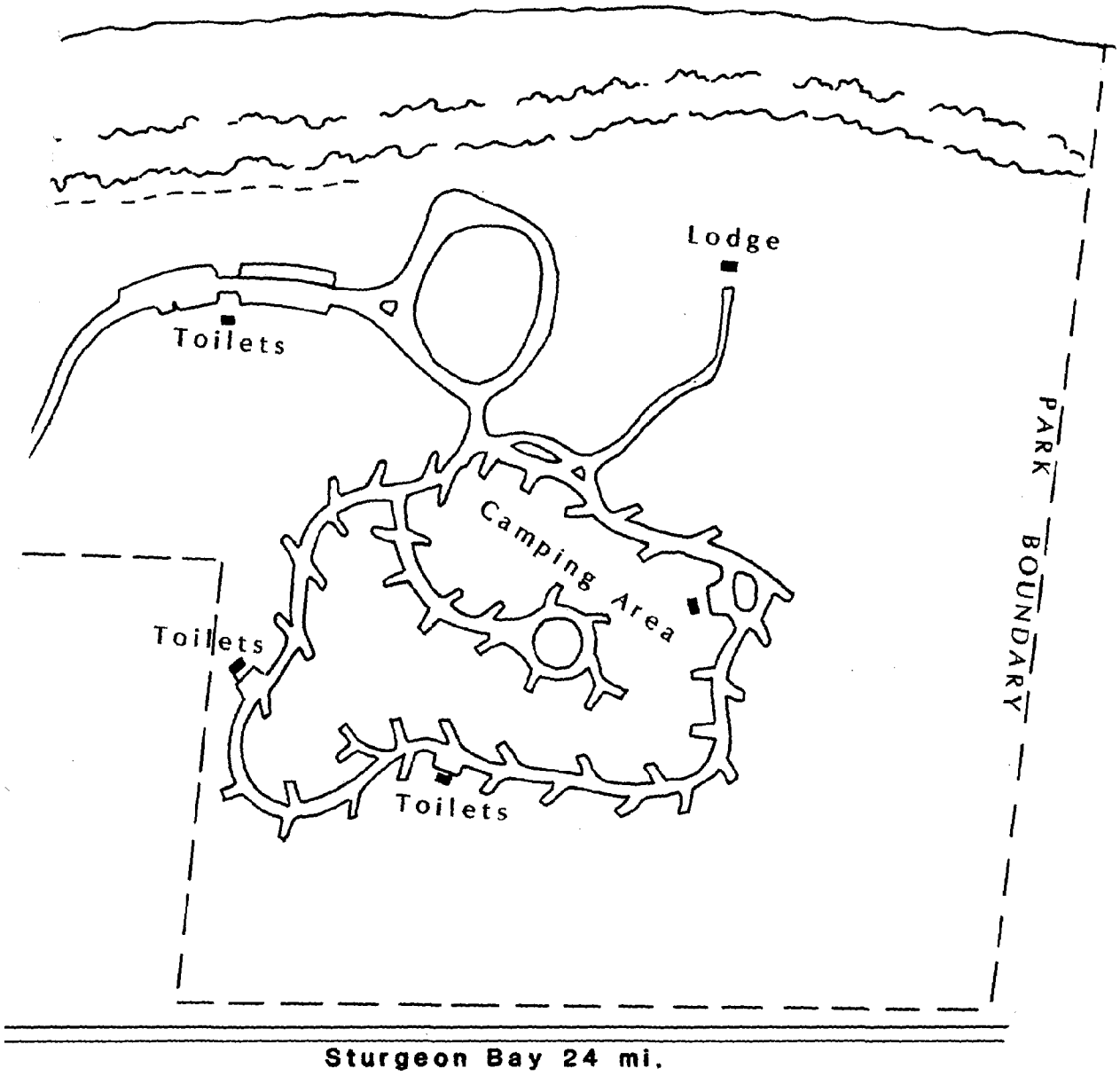

HARBOR
Parking
Access Road
Caretaker
Toilet/
Shelter
Baseball
Diamond
Parking
PARK BOUNDARY
PRIVATE
PROPERTY
PRIVATE
PROPERTY
STH 57
17 mi. Green Bay

Figure 2

GREEN BAY



BAYSHORE PARK

Brown County

N

0 400

Feet

Most unique about the Bayshore Park boat harbor and associated camping park, is that park personnel estimate that about 80% of the parks users come from the City of Green Bay and surrounding urban area. This may be due to a number of factors:

1. Bayshore Park is a relatively new park, and it's use is therefore by those who are close to the facility.
2. There has been little advertising or publication about the park and consequently few tourists utilize the facilities.
3. Demand and congestion at boating facilities in the City of Green Bay is great enough that it is convenient for boaters to drive to a nearby park.

As boating becomes more popular and with boaters staying closer to home due to energy considerations, the above mentioned factors may change-and exert greater boating pressure at the park facilities.

Fishing

With the development of the rubble breakwater, and subsequent boating facilities, an interest in fishing has developed. The most popular and abundant species for fishing in the Bayshore Park area is the Yellow Perch. Excellent catches of large perch are reported all year, with the best fishing during the spring and fall. Although some boats leaving the present harbor troll for trout and salmon, many remain near the park due to the fine fishing along the rocky bottom.

During peak fishing times, it has been reported that not only was there excellent fishing from boats near the harbor but that fishermen were virtually lined up on the breakwater for its entire length. This type of activity is expected to continue to increase due to the park's proximity to the City of Green Bay population area. Should an additional length of breakwater be constructed, it would be expected to provide additional space for fishermen therefore relieving congested conditions and improving the quality of the fishing experience. Additional subsurface structures could be expected to be very attractive to perch and other game fish present in the Bay.

A new development in fish stocking by the Wisconsin Department of Natural Resources may have an impact on fishing demand in Green Bay. In 1973, the D.N.R. began a program (partially subsidized by the Federal Government) of re-introducing the Walleye Pike to the waters of Green Bay.

An estimated 300,000 Walleye fingerling and 10,000,000 Walleye fry are being planted annually. About 60,000 fingerling Walleyes were planted at Bayshore Park during 1980. The success of this reintroduction program has been evidenced by the excellent growth rate of the fish where in a period of only 3-4 years the fish are achieving lengths up to 18".

Fishing has in turn picked up substantially, and as these fish grow and a brood stock is maintained, fishing for Walleye may become a very popular attraction for boaters. It has already become attractive in some areas, as it is reported that Walleye fishing below the De Pere dam has at least doubled in the past few years.

Based upon the present numbers of boat launchings for fishing at Bayshore Park (as many as 3,600 launchings annually) an increase of at least 50% could evolve over the next 5 to 10 years just based upon the present and future successful re-establishment of a Walleye fishery. In a similiar program in

Lake Erie, when the Walleye fishery became re-established, a six-fold increase in angling was experienced in less than 5 years.[0] Discussions with Ohio D.N.R. representatives indicate that the harbors and launching areas closest to large communities are filled to capacity almost daily.

Harbor of Refuge

Aside from providing a recreational boat launch ramp, the Bayshore Park breakwater serves as a harbor of refuge from storms on the Bay. During storms, it has been estimated by park managers that in addition to the normal returning number of boats that originally launched at the park, Bayshore Park serves about one to three boats as a harbor of refuge. These crafts are ones that would typically be en-route between marinas or be too far from their original launch site to return in a storm.

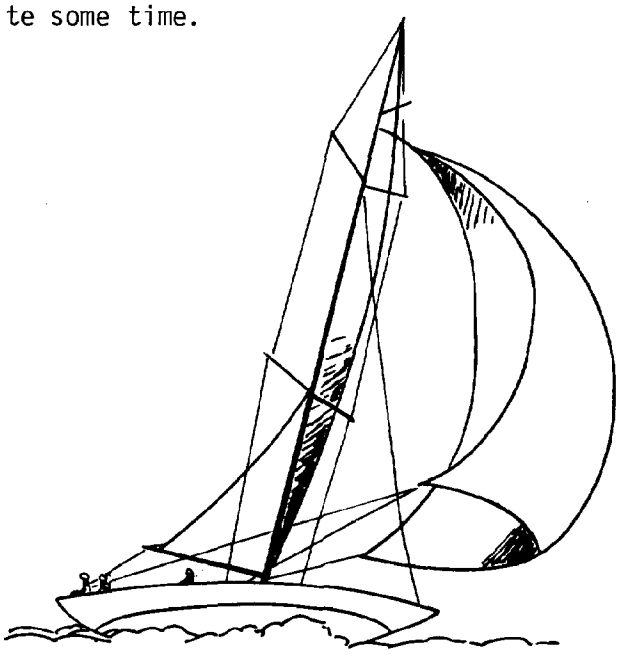
Generally, harbors of refuge should be a maximum of about 15 miles apart, thereby offering storm sanctuary at a maximum shoreline distance of 7.5 miles to the nearest harbor. Bayshore Park is well situated to act as a harbor of refuge in that it is approximately midway between the City of Green Bay and Little Sturgeon where public boat harbors are located.

In a 1974 Corps of Engineers study,[1] a formula was used to estimate the number of transient boats typically found between marinas. This study indicates that about 3.3 transient boats can typically be found between Little Sturgeon and Green Bay that would be caught in severe weather. For the spring and fall, the probability of a severe storm in a week was one in five but during the summer, one in thirteen. Boating activity in the summer does however significantly increase thereby increasing the number of boats potentially caught in severe weather.

With projected increases in the number of boaters in this geographic area, the number of boats that would require use of a harbor of refuge also increases proportionally. For the ultimate capacity sizing of the future breakwater and harbor it is reasonable to assume that a maximum of 10 boats would be using Bayshore Park facilities during storm conditions. This allows for a tripling of the present boating rate. An increase in this number of boats could be seen if the proposed Bay Beach Marina in the City of Green Bay is constructed. It is expected that potential Bay Beach boaters would commonly travel by water to Bayshore park for the day, and return to Bay Beach in the afternoon. Should there be unexpected storms, Bayshore Park would have to provide temporary mooring space for these boaters.

As communication equipment such as CB radios and ship-to-shore radios become more common, it is hoped that weather information and severe weather warnings would tend to reduce the number of boats that would be caught by surprise during storms.

The important safety function of a harbor of refuge should be underscored for this particular reach along Green Bay. With the limited potential for additional new harbors between the City of Green Bay and the Sturgeon Bay area Bayshore Park facilities will be necessary to serve as a sanctuary during storms, for quite some time.



SECTION III

Present and Future Needs

Present Needs At the Bayshore Harbor

Presently there is inadequate protection for craft within the harbor when storms approach from the northeast. Wave action is not sufficiently dampened to avoid damage to water craft. Entry to the harbor during storms is hazardous. This condition is a result of a modification to the original plans whereby the binwall structure was repositioned 30 feet to the east in an effort to increase the storage area within the harbor. A breakwater extension should have been constructed to accomodate the repositioning of the binwall. Because of budgetary considerations the extension was not constructed.

The holding capacity inside the breakwater is limited to perhaps 30 average sized craft. Mooring places are available for a maximum of about 15 boats. During storms with wind from the northeast, it becomes difficult to get boats out of the water due to waves within the breakwater, and subsequent pier movement at the launch ramps.

Future Demand Estimates for the Bayshore Park Boat Harbor

Numerous studies have been conducted in the past few years regarding the changing status of Great Lakes boating. Without exception, each of the trends listed, and projections presented, indicate an increasing level of demand at the present boating facilities, and in some cases the studies show the absolute need for new or expanded facilities.

Boating activity projections are based primarily on such clear evidence as:

- increases in the number of boating participants.
- increases in the boater registrations of the Upper Lake Michigan areas.
- increases in the population of the primary market areas of Upper Lake Michigan boaters.
- increased interest in fishing in Lake Michigan in the past decade.

Subsequent to the increased activity in Lake Michigan boating there has been an increased awareness of the necessity of having harbors of refuge during severe storms. In addition, studies such as Economic Impact and Needs of Wisconsin's Great Lakes Boaters[2], and Impacts of Recreation in the Coastal Area : Demand and Supply of Recreation in Wisconsin's Coastal Counties[3], prepared during 1976 and 1977 respectively, by the Recreation Resources Center, University of Wisconsin-Extension, reveal that Wisconsin's Great Lakes boaters spent about $13 million just during the 1975 boating season. Considering similiar spending, no additional boating, and just adjusting for inflation (avg. 10%/year) those same boaters will be spending over $24 million during the 1981 boating season. Any increase in participation since 1975, or projected into the future, increases the dollars spent substantially. Average expenditures for each boating party in the upper Lake Michigan area (including the Bayshore Park area) was about $45.00 per outing in 1976.

Population Increases

Having estimated that 80% of the Bayshore Park recreationists came from the City of Green Bay area, the population changes of this area will indicate potential demand changes at Bayshore Park. In 1970 the Brown County population was 158,244. The 1980 preliminary census data reveals a population of 175,470. This shows an increase of 10.9 percent.

Boater Registration Increases

A review of the number of boater registrations in the Upper Lake Michigan Area reveals significant increases from 1971 to 1979. The entire Upper Lake Michigan Area averaged an increase of 32.6 percent in boater registration, and Brown County (known to be the greatest contributor of boaters to Bayshore Park) increased at 43.4 percent.

Increased Interest in Lake Michigan Boating

The lack of comparable historic data makes an accurate quantitative estimate of increased interest in Lake Michigan boating difficult. There are however considerable indicators of this increased interest.

- Since the planting of salmon in the Lake, many charter operators have opened on the Lake.
- In the time frame of 1970-1974, 95 to 100 percent of the slips in the Upper Lake Michigan region were rented.[7] In 1975 surveyed marinas were at full capacity. Phone conversations with marina owners and operators confirms that in 1980 and 1981 marinas would be virtually at full capacity with many areas having lengthy waiting lists.

Boating Participation Increases

A 1972 study showed that of the five Counties bordering Green Bay, 45% of the boat owners of those Counties used Green Bay and Lake Michigan for boating. At that time, the study reported that among the boaters who did most of their boating inland, 58% described the Bay as "dirty".[4] As the Fox River waters continue to show excellent progress in becoming cleaner, the percentage of boaters using the Bay from these Counties is expected to increase.

Boating participation during the 1970-1980 decade increased substantially in Coastal Counties. On the average summer weekend day, the increase from 1970-1980 was 115 percent. For Brown County, the greatest source of boaters to Bayshore Park, the increase was near average at 115.4 percent.[5]

The Brown County Planning Department estimates that presently one of every five households in the County owns a boat and partakes in boating activities. The Planning Department also feels that the upper Lake Michigan area could use an additional 1,000 to 1,500 boat slips to accomodate the present demand. A plan to develop the Bay Beach Marina was defeated at public referendum, and its development is uncertain at the time of this writing.[6]

Projected Boating Needs in the Bayshore Park Area

As described earlier, Bayshore Park harbor accommodates an estimated 7,200 launchings annually, with its four launching ramps, and has waterfront parking for about 70 cars and trailers. Using the available known indicators to project boating needs, the following information regarding needs can be established:

Using population increases for the region as a guide, and assuming boating participation stays the same, in the year 1990 there would be a demand for 7,984 launchings at Bayshore Park and in the year 2000, 8,854 launchings at the park.

Using population increases for the region plus adding a figure of 32.6% increase in boater registration, in 1990 a demand for 10,586 launchings can be expected and in the year 2000 a demand for 14,038 launchings can be expected.

Both of these estimates must be accommodated by the additional consideration of the increased transient boater traffic in the Bayshore Park area, and the estimated expanded harbor space requirement to hold an additional 10 boats (see text on harbor of refuge) during the severe storms.

A 1974 Corps of Engineers Study[8] confirms the projections for additional boating facility needs in the next twenty years. This study indicated that between the City of Green Bay and Sturgeon Bay areas substantial increases in berths and mooring spaces will be in demand.

Berth and Mooring Demands*

	Year 1980		Year 1990		Year 2020	
	Berths	Moorings	Berths	Moorings	Berths	Moorings
City of Green Bay Area	140	35	285	70	640	160
Sturgeon Bay Area	115	35	175	50	245	70

Launch Lane Demands

	Year 1980 Lanes	Year 1990 Lanes	Year 2020 Lanes
City of Green Bay Area	0	0	7
Sturgeon Bay Area	11	15	24

*Source: Lake Michigan Regional Boating Survey and Analysis, Corps of Engineers, 1974, p. 62.

Care should be exercised in constructing too many launch lanes at a given site, as the provision of the lanes induces a certain level of demand in itself. An estimate of how this induced demand operates is shown in the following table.

Induced Launch Demand in Launches Per Season*

Increase in Launch Lanes	Induced Launches Per Season
1	800
2	1,200
3	1,450
4	1,650

*Source: Lake Michigan Regional Boating Survey and Analysis, Corps of Engineers, 1974, page 58.

SECTION IV

Summary of Demand Projections

- Without any new attractions to lure boaters to the Bayshore Park area, demand will increase by about 68% through the year 1990. By the year 2000, about 100% increase in boating pressure may be expected.

- Any new programs, such as the walleye planting program, sponsored by the D.N.R. should increase the interest in boating substantially - perhaps a 50% increase in the number of fisherman using Bayshore Park.

- To accomodate the number of launches expected by the years 1990 and 2000 an additional launch lane might need to be constructed. An "induced" additional demand (would likely be created by that construction of perhaps 800 launches per season).

- Harbor of refuge calculations indicate that the Bayshore Harbor should provide the capability of providing sanctuary for about 10 additional boats by the year 2000. More area may be required should the Bay Beach Marina in Green Bay be constructed during the next 10 years.

- There is presently already a shortage of berths and moorings along the east side of Green Bay, through the Sturgeon Bay area. By the year 1990, over 140 mooring sites would be in demand and over 460 berths in demand. Although berths or slips have not been considered as being accommodable at Bayshore Park, it is clear that by the year 2000 at least twice as many temporary mooring places, as present, will be in demand. Future designs should accomodate as many mooring places as possible within the harbor.

Advantages of Expanding the Bayshore Harbor

Maintenance costs at most of Lake Michigan and Green Bay marinas and harbors are a key in the economic feasibility to their development. Proposals to construct new harbors and marinas or their expansions require income projections that adequately cover the maintenance costs.

One of the highest maintenance costs typically associated with marinas on the Great Lakes is the on-going dredging requirement. Frequently the costs of dredging can clearly be shown as being covered by the expected income from boat launch and berth rental fees. Bayshore Park has the geographic advantage of having a shoreline that requires very little maintenance to keep the facilities operational.

The lack of large quantities of littoral drift (suspended material such as sand that is carried in the water) indicates that little sedimentation occurs within the harbor and consequently dredging is not required. To date, little difference in water depth has occurred within the harbor due to the construction of the breakwater and dredging costs have not been necessary as a budgeted maintenance item.

The extension of the harbor, even to ultimate capacity, would not be expected to require future dredging as an ongoing maintenance item. This is a significant operational advantage over other harbor areas.

SECTION V

Miscellaneous Plan Recommendations

During the analysis of the harbor facility, a number of other park activities frequently related to the boating function of the park were reviewed. Generally the park organization and operations are felt to be very good, and some of the following observations are forwarded to maintain and increase the quality of recreational use of the park.

1. Due to the highlight of Bayshore Park - the harbor facility - substantial pedestrian activity takes place at the waters edge. It is suggested that electricity be provided at the waterfront for night lighting, a telephone be made conveniently available and that rest room facilities and a boat waste pump-out station be provided.

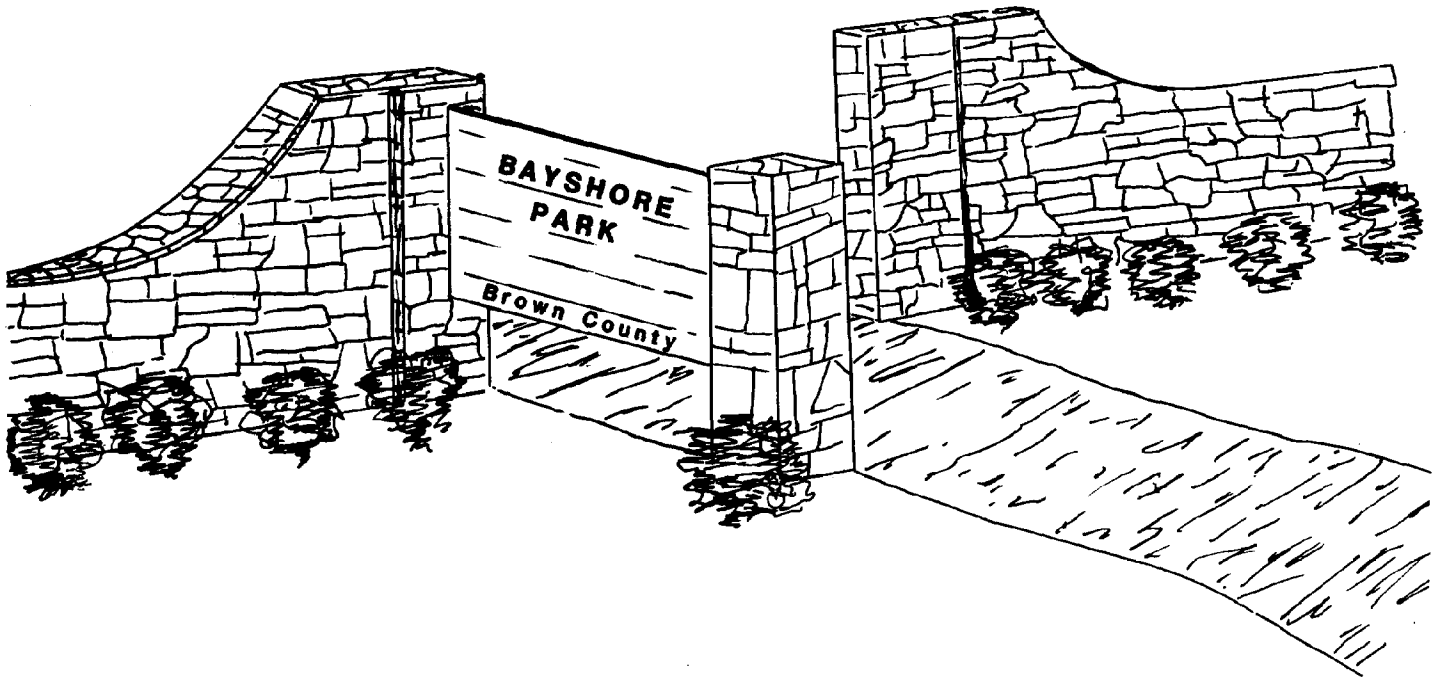
2. The two primary centers or nodes of activity in the park are the campgrounds and the harbor. Pedestrian traffic between the two would be facilitated by steps down the bluff at a location preferably just east from the caretakers residence. These stairs could be constructed from natural materials such as wood or stones to blend with the natural appeal of the bluff. Due to the steep slope, safety would be enhanced by providing handrails along the steps. In addition, steps would remove much of the pedestrian traffic along the access road. People are now forced to walk down the road, as it is the only pedestrian a access to the waterfront. The road cut has little "shoulder", so people are required to walk on the road. Although no accidents have been reported to date, this situation should be remedied if possible.

3. Construction of a short walking path along the bluff is presently occuring. It is suggested that at the farthest eastern point of the path, steps be placed down to the lake front. Hikers could then walk back along the waterfront

and loop back up to the campground on the stairs mentioned in point #2 above. Without looping the route, hikers would be forced to retrack their path.

4. It is suggested that a bulletin board - display case be located at the harbor. This information board would contain emergency services phone numbers, weather information phone numbers, radio station call numbers, a map and description of nearest harbors of refuge, boating related goods and services nearby, boat launch and parking rules, and similar information. For safety this would be very helpful, and it would answer many questions typically requested of the park manager and staff. This type of information board need not be an expensive or overly elaborate creation, but should be water-proofed with perhaps a plexi-glass front to deter vandelism.

5. The only entryway to Bayshore Park is presently from Highway 57. To enhance a "gateway to the park" entry, perhaps consideration should be given to landscaping the entryway around the beautiful stone walls. An identifying sign framed by similar materials, such as a wooden sign with stone support would make the entry even more appealing.



6. Due to the increased projected use of the park, more space will be demanded for typical "active" recreation facilities such as football, baseball, frisbee throwing, kite flying, soccer, tennis, playground equipment, etc. These activities require level land, preferably clear of trees. Acquisition (if possible) of acreage between Highway 57 and existing park lands is highly encouraged. This could not only facilitate additional parking for the shelter building but also provide the needed space (away from the bluff) for the above mentioned active recreation uses.

7. Although swimming along the shoreline is likely to continue in demand, the physical conditions of steep slope and very little littoral drift necessary for sand deposition make creation of a beach area difficult. Neither lands directly to the east or west of the harbor provide favorable beach sites. It is perhaps possible to allow for sun bathing and similar activities on the shoreline, but long term establishment of a sandy beach seems remote. To not encourage swimming also relieves the County of necessary supervisory or life guard personnel, and larger clean-up and safety liabilities.

Park Management

Management of the park and harbor has to date been excellent. The facilities are in fine condition and the presence of a resident caretaker has enhanced the operation and expansion of the facilities.

Presently the use of the harbor and launch ramps is free, with a camping charge levied by the night. The laws allow that the maintaining agency owning the park (Brown County) may charge reasonable launching fees if desiring to do so. To date there has not been a need to levy launch fees.

The latest federal proposals are indicating substantial cutbacks in CETA employees, therefore park maintenance funding may become more of a responsibility strictly of Brown County. Should this come about, a greater burden will be placed on existing management persons. Projected growth in the camping areas as well as in the harbor area would indicate the need for maintaining at least the present level of staffing.

Should maintenance costs become overly burdensome, revenues could be generated by charging nominal boat launching fees. Such a rate could be a $2.00 per day launch fee. At an estimated 7,200 launches per year, about $14,000 should be generated. Administration and collection of the launch fees could be on a periodic check program, as such a program would work on an honesty basis. Labor cost to collect fees is minimal. Typically launch fee collection might be in self-sealing envelopes $2.00 per day pay before launching. On the envelope information would be requested such as:

Car make and license number _____

Boat make and license number _____

A stop sign at the top of the bluff and collection box (some pipe-type collection boxes made of steel have proven more vandalism proof than wooded boxes) would need to be provided. Boaters could fill out the envelope, enclose $2.00 and drop the envelope into the collection box. Envelopes would be collected daily, and based upon the availability of personnel, periodic checks of parked cars and trailers would be made to assure that all would have paid. This or any other fee system should be applied only upon evaluation of the necessity to charge for services. that is presently given free to campers at the park.

SECTION VI

Design Alternatives

Expansion of the harbor facility to accommodate the need for refuge and to satisfy projected demand for mooring space can be accomplished by various designs. Two feasible alternatives are presented in Figures 3 and 4. Both are compatible with the present facility and serve the intended purpose.

Alternative 1 features a harbor entry open to the west-northwest. The harbor would be expanded in two segments, one being a 160 foot extension of the present breakwater parallel to the shoreline and a second being a 300 foot segment perpendicular to the shore followed by a 150 foot dog-leg to the northwest. With winds prevailing from the west and northwest, a boater would leave the harbor powering into the wind and would return with the wind at his stern. Upon entering the harbor, a minor change in course would be needed to insure entry into protected waters. The waves generated by winds out of the west and northwest will enter the harbor; however, they will be dampened somewhat when they reach the inside face of the rubble breakwater. Considering also waves generated by winds out of the north and east, this alternative design configuration provides a more positive degree of protection. Only reflected waves could be expected to enter the harbor.

Alternative 2 features a harbor entry oriented in an easterly direction. The expansion would include two separate breakwater segments, one being a 360 foot extension of the present breakwater running parallel to shore and a second being a 120 foot structure perpendicular to the shoreline. The latter segment could be either binwall type or rubble mound type construction. This alternative provides excellent protection from waves generated by winds

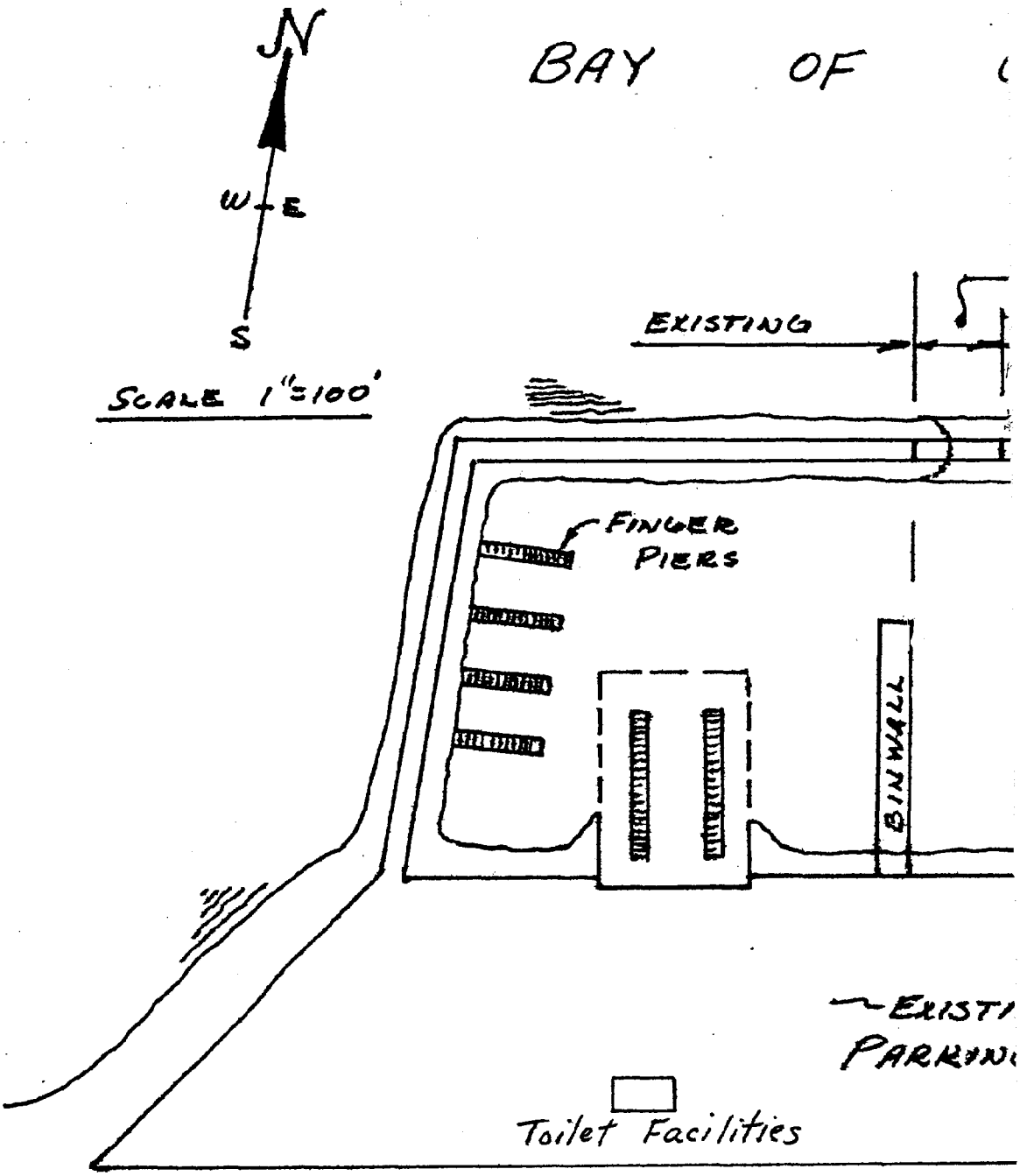
prevailing from the north and west; however, little if any protection is provided against wave action from the east and northeast. This may not create a severe problem considering that winds from the east are usually of low velocity (less than 10 m.p.h.). Easterly winds greater than 10 m.p.h. that could cause significant wave action occur less than 2% of the time when considering all winds occuring at the site.

The most difficult time for a boater to approach the harbor would be when the winds are from the northeast. A slight change in course is required as the boater passes the end of the main breakwater structure. Any error in judgement or loss of power could result in his being blown onto the shore at some point outside of the confines of the harbor.

Future Expansion Considerations

Alternative 1 would be considered as the final development phase since its configuration does not lend itself to expansion to the east. Any expansion in that direction would require reconstruction of portions of the breakwater structure.

Alternative 2 is more open ended and lends itself quite readily to future expansion to the east. Note that the outer breakwater could readily be extended eastward parallel to the shore along its present alignment.



HARBOR DEVELOPMENT PLAN

BY: OWEN AYRES & ASSOC.
GREEN BAY, WIS
MARCH 1981

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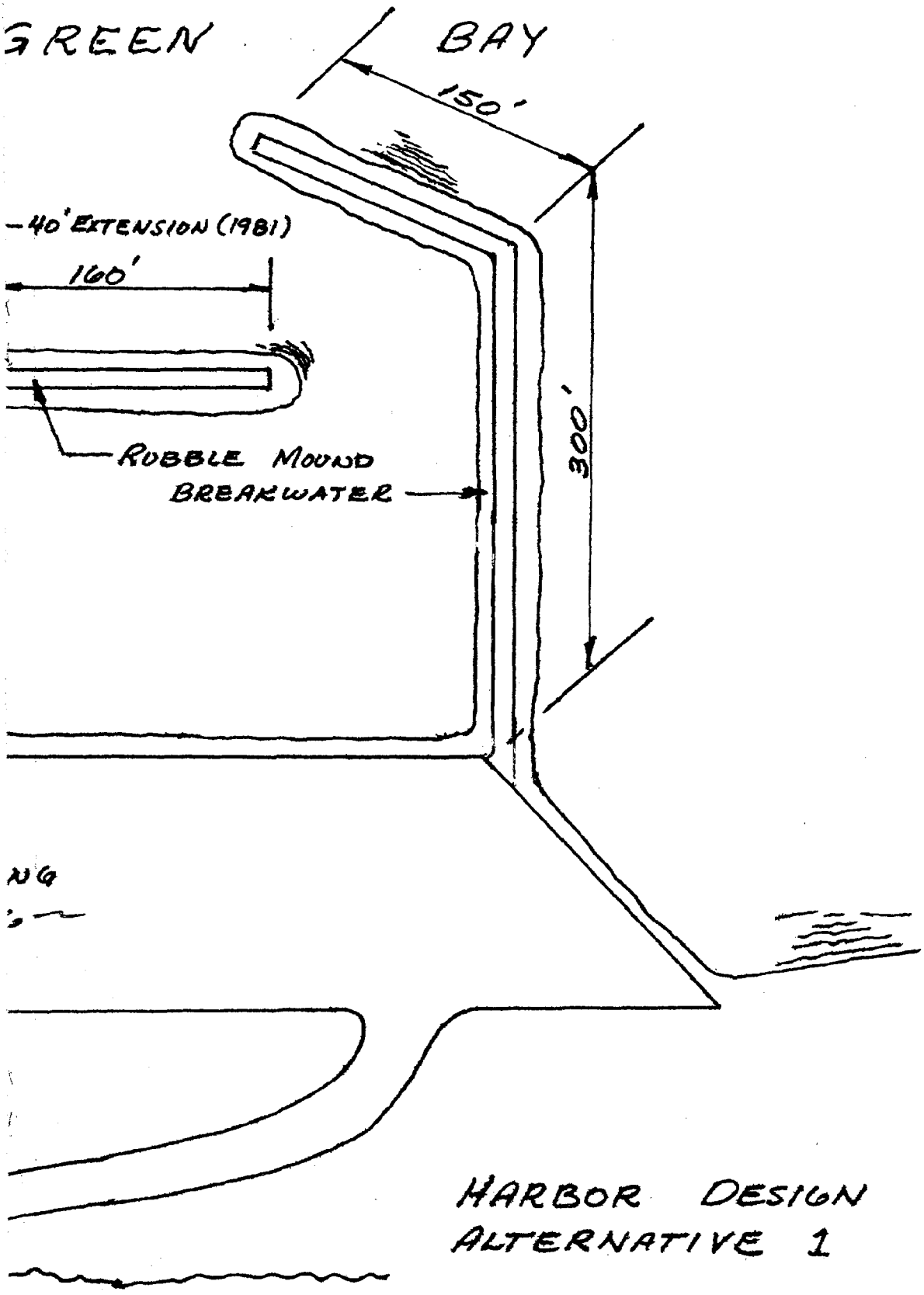
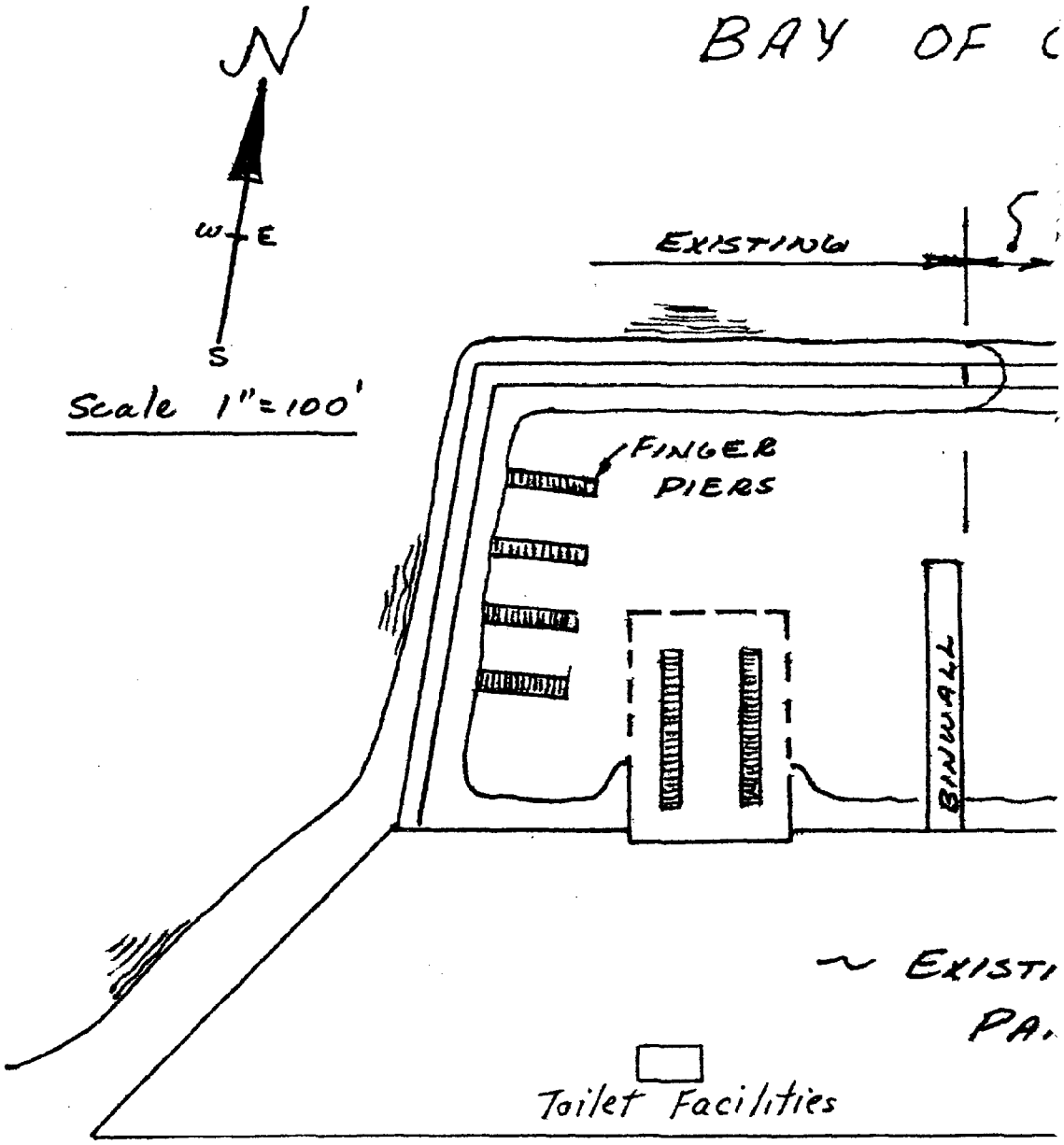


HARBOR DESIGN
ALTERNATIVE 1

BAYSHORE PARK
BROWN COUNTY, WIS

Figure 3



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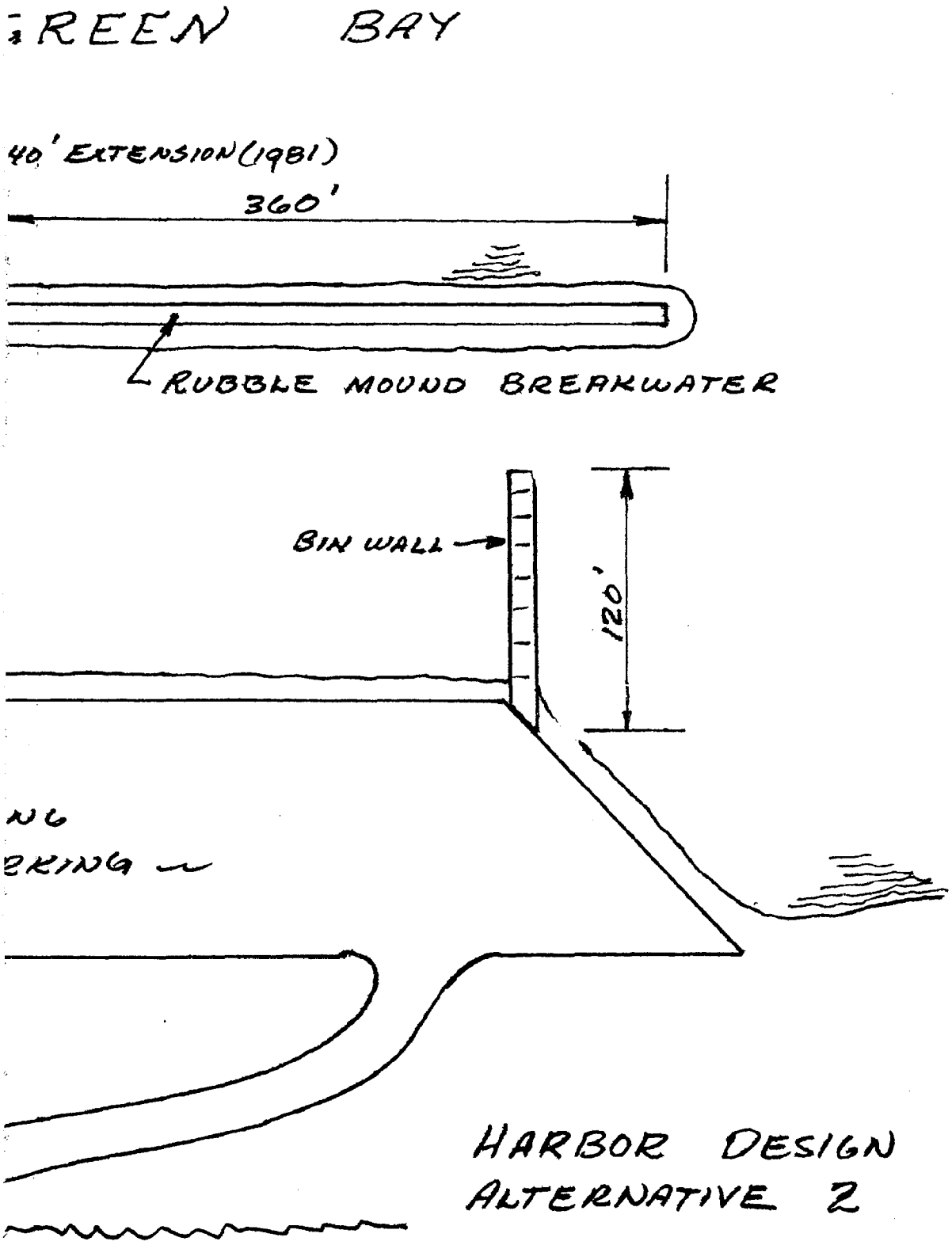


HARBOR DESIGN
ALTERNATIVE 2

BAYSHORE PARK
BROWN COUNTY, WIS

Figure 4

Interior Space

Both design alternatives offer the same amount of interior space as shown on the Conceptual Design Sketch. (Figure 5).

The existing finger piers along the west breakwater are too short to comfortably accommodate two craft on each side. A minor extension of these piers would effectively double the intended mooring space. Water craft of various sizes could moor in tandem with some extra space being allowed between craft.

Pier Arrangement

Provision of a trunk pier extending perpendicular from the shoreline with branching finger piers seems to offer the best arrangement. Large boats could utilize the slip farthest from shore in deeper water with smaller craft occupying the slips in shallower water near the shoreline. This arrangement also minimizes the distance that boaters must transport their gear in transferring it from their autos to their boats. All surfaces of the floating pier system would float at the same level except for the section connecting the system to the shore. The slope of this connecting section would vary depending on water levels in the bay. Tandem mooring is shown on the conceptual design, Figure . Distance between piers would be on the order of 30 feet to allow suffifient clearance for the forward moored craft to exit between two rear moored craft. A respacing of the main trunk pier(s) could allow for single instead of tandem mooring.

The present binwall structure could be retained and utilized primarily by larger craft. Some difficulty may be experienced in embarking and disembarking during low water periods because of the elevation differential between the top

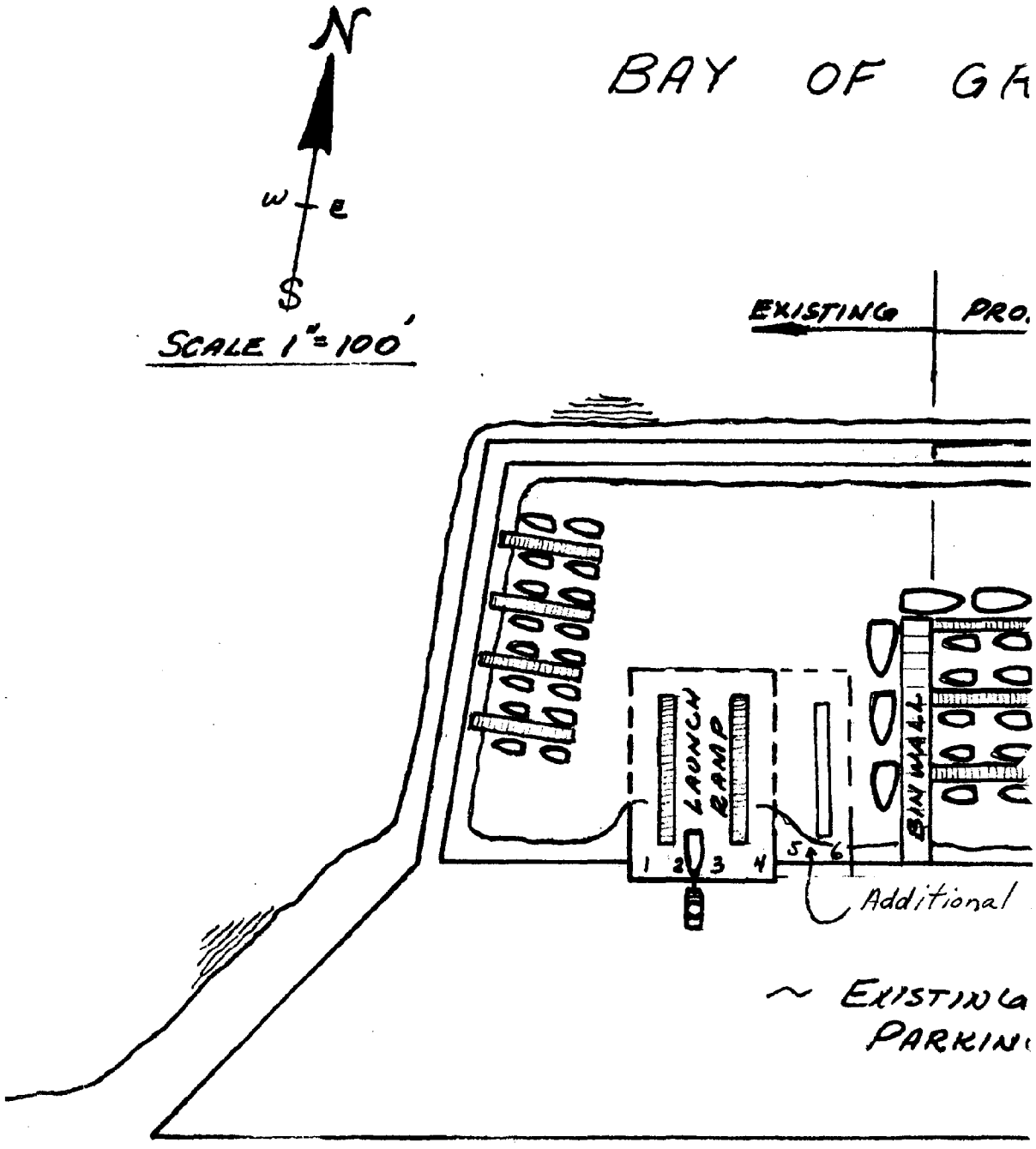
of the binwall and the water surface. This could be rectified by adding finger piers perpendicular to the structure with ramped sections to account for fluctuation in water levels. During periods of low water, the slope on the ramped portion of the finger pier could become excessively steep thereby creating a hazard. A longer ramp would detract from the usable portion of the overall pier length. Therefore, removal of the binwall and replacement with a floating pier system should be considered since it no longer needs to function as a breakwater.

Launch Ramps

Presently, there is a 70 foot wide concrete launch ramp providing four launch lanes. Two floating piers exist parallel to the launch lanes. Each pier is positioned to service two launch lanes. Sufficient space is available on the easterly side of the present ramp to add additional lanes if needed in the future, especially if the binwall structure is removed.

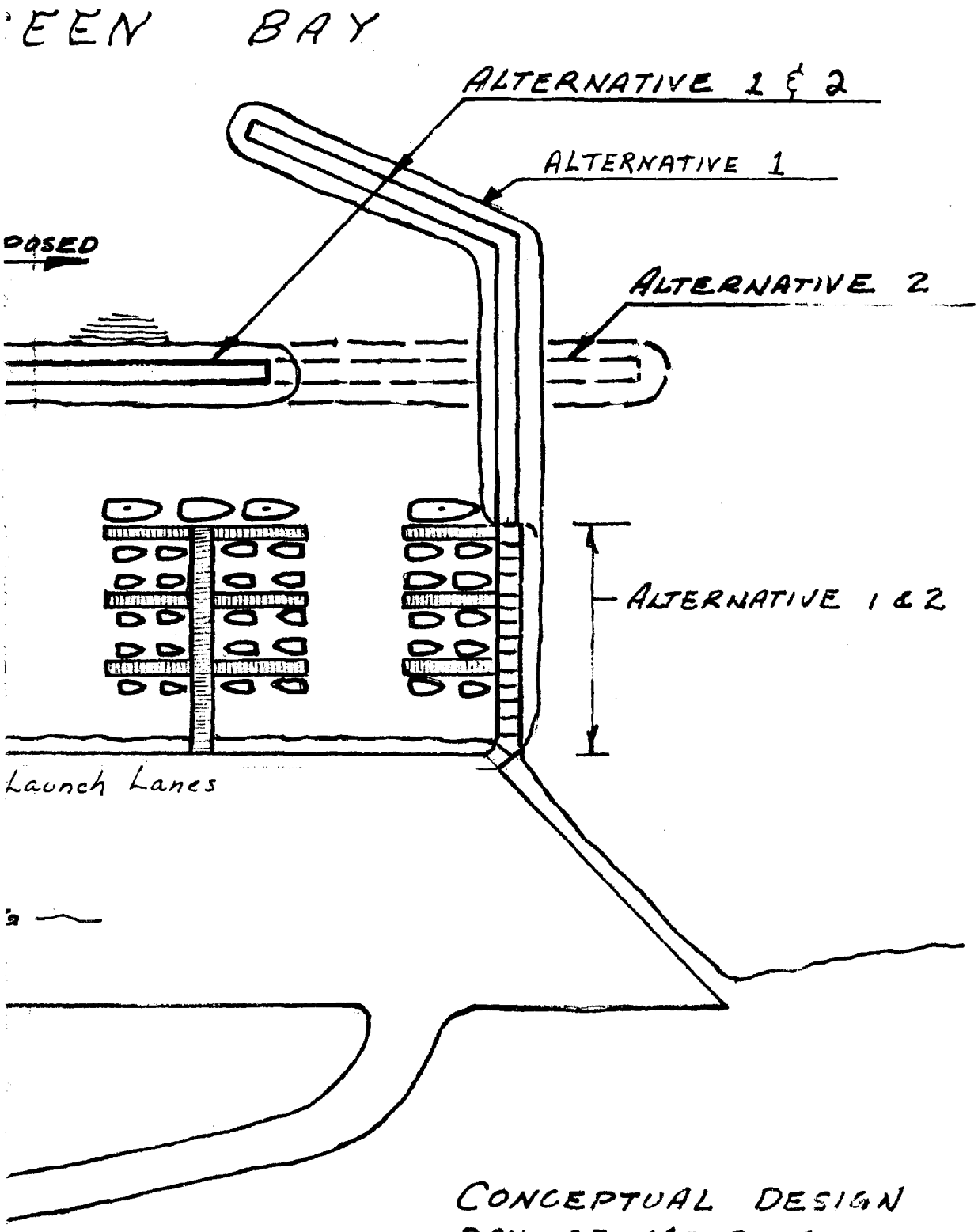
Auto Parking

A gravel parking lot approximately 700 feet long by 130 feet wide (about 2 acres) presently serves the harbor facility. Depending on the traffic flow scheme and parking arrangement, it is estimated that about 70 car and trailer units can be accommodated. Sufficient maneuvering space is allocated for approaching the launch ramps and also for entering/exiting the lot. The launch ramps are located at the westerly end of the lot thereby minimizing interference with traffic flow. During peak use times, the existing parking lot is reported to be completely full, and as demand increases and should the harbor be enlarged, parking needs will surpass the present capacity. Two alternatives are available in the development of additional parking facilities.



HARBOR DEVELOPMENT PLAN

BY: OWEN AYRES & ASSOC.
GREEN BAY, WIS
MARCH 1981



CONCEPTUAL DESIGN
DAY USE MOORING

BAYSHORE PARK
BROWN COUNTY, WIS

Figure 5

One alternative would be to relocate the baseball diamond on top of the bluff, and convert this space to car and boat trailer parking. The baseball diamond and back-stop fencing would require relocation to another site. An ideal location for the baseball diamond would be to the southeast of the park shelter toward S.T.H. 57. This would however require the purchase of the property from a private party to add to the park. The advantages to this parking alternative are that it is the closest land to the launch area that is level and wooded. If the baseball diamond were to be relocated in the near future (even before harbor expansion) the space could be used for overflow parking. The disadvantages to overflow or additional parking at any place on top of the bluff is that it requires pedestrian traffic to use the access road as a connecting walkway.

A second alternative would involve considerably more construction along the lake shoreline and would involve extending the present parking lot to the east or west. This would require establishing a new bulkhead line and bringing in fill to create a level parking facility at the shoreline. The advantages to this alternative are that it consolidates all of the parking at one single location. Access to boats is convenient, other park functions already in place (such as the baseball diamond) would not be impacted or require relocation, and the development would not require puchasing additional land. Disadvantages to this parking alternative include obtaining permits for filling at the waterfront, finding a source for the needed fill material, creation of a slightly greater development impact at the waters edge and increased development costs.

Boat Traffic

Similarly as with auto traffic, the launch ramp location on the westerly end of the harbor away from the harbor entrance minimizes interference with boat traffic. Launch and load activities are somewhat removed from mooring and entrance/exit activities.

Type of Construction

The present breakwater is constructed with rock fill forming a rubble mound. This type of construction was originally selected for several reasons. A rock like hardpan bottom condition at the site did not lend itself to pile driving or excavating. Extending the breakwater can be accomplished merely by placing additional rock fill to form the desired configuration. This type of construction causes the least disturbance from an environmental standpoint and is nonpolluting. Fill material is also available close to the project site.

A steel binwall type structure with interior rock fill and paved surface presently serves as the easterly breakwater. Its vertical face allows it to also be utilized directly for docking and mooring. Comparing it to the rubble mound, the binwall tends to reflect waves rather than absorb them.

For both alternatives, a binwall structure of similar length and orientation could be incorporated into the easterly leg of the breakwater extending approximately 120 feet out from the shoreline. This would provide additional mooring space.

Water Depth

The outer leg of Alternative 1 extends into slightly deeper water as compared to Alternative 2. The east-west leg of Alternatives 1 and 2 runs parallel to the shoreline and also parallels the bottom contour. The volume of fill material required to construct it would be essentially constant along its length. Height of fill measured from the bay bottom to the top of the breakwater would be approximately 19 feet. For Alternative 1 at the far end of the outer leg, the fill height would be 21 feet from bay bottom to top of structure. Since the breakwater is trapezoidal in cross section, the additional 2 feet of fill height for Alternative 1 translates into an additional volume of fill at the base of the structure and thereby increases its cost of construction.

SECTION VII

Costs

The major share of the total capital improvement costs will be expended on the construction of the breakwater. The costs will vary depending on the design alternative selected. Construction cost for each of the two suggested alternatives is a follows:

Alternative 1

a. Average 19 foot high rubble mound 160 linear feet @ $2,000 =	$ 320,000
b. Average 15 foot high rubble mound 300 linear feet @ $1,550 =	465,000
c. Average 21 foot high rubble mound 150 linear feet @ $2,260 =	339,000
Total Estimated Construction Cost =	$1,124,000

Alternative 2

a. Average 19 foot high rubble mound 360 linear feet @ $2,000 =	$ 720,000
b. Average 15 foot high rubble mound or binwall 120 linear feet @ $1,550 =	186,000
Total Estimated Construction Cost =	$ 906,000

Other development costs will be incurred in providing the remaining improvements that are either necessary or desirable to complete the facility. These costs could vary considerably depending on their configuration, size, material makeup and location. Based on the quantities and physical arrangement of facilities shown on preliminary plans developed by the County in 1976 for shore related facilities, the following total development costs have been estimated (in 1981 dollars):

ESTIMATED PROJECT DEVELOPMENT COSTS

Breakwater structure (average of two alternatives)	$1,070,000
Interior dock system	150,000
Toilet building	40,000
Water and waste handling systems at waterfront	65,000
Electrical distribution and lighting systems	65,000
Additional parking at top of bluff	25,000
Stairways, walks, and traffic control devices	20,000
Total Estimated Construction Costs	$1,435,000
Engineering fees and administration expenses	
10% of construction costs	143,500
Contingency fund - 15% of construction costs	215,500
Total Estimated Development Costs	$1,784,000

FOOTNOTES

0) Lake Erie Fisheries Investigations, Ohio Department of Natural Resources, Division of Wildlife, Dingell-Johnson Projects F-35-R, R-35-R, F-35-R-18. 1979.

1) Lake Michigan Regional Boating Survey and Analysis, Department of the Army Corps of Engineers, January 1974, page 50.

2) Economic Impact and Needs of Wisconsin's Great Lake Boaters, Ayse Somersan, Extension Recreation Resources Center, July 1976.

3) Demand and Supply of Recreation in Wisconsin's Coastal Counties, Ayse Somersan U.W.-Extension Recreation Resources Center, February, 1977.

4) Marine Recreational Uses of Green Bay: A Study of Human Behavior and Attitude Patters, R. Ditton and T. Goodale, U.W. Sea Grant Program, Report #117, December, 1972

5) Ibid 3. Table 4, page 24.

6) Information regarding proposed development of additional boating facilities in the City of Green Bay and nearby areas is from telephone discussions with the Brown County Planning Department during February of 1981.

7) Ibid 2, pp. 38-39.

8) Ibid 1, pp. 58, 62.

SECTION VIII

Appendix

ENGINEERS
PLANNERS
SURVEYORS

OWEN AYRES & ASSOCIATES INC

1789 SHAWANO AVENUE
GREEN BAY, WISCONSIN 54303
(414) 497-1541

Dear Madam or Sir:

You have been identified as an individual who represents an association or a unit of government that might have an interest in planning Bayshore Park. As you may know, Bayshore Park is along the east shoreline of Green Bay about 17 miles northeast from the City of Green Bay. Long term design plans are being presently created by the Brown County Park Commission and its consultant OWEN AYRES & ASSOCIATES INC to assure that development at the park - particularly in the harbor - is consistent with long range plans.

Along with this cover page, you will find a brief summary of key findings in demand for use of the park facilities and two alternative harbor designs to accommodate projected demands. A conceptual design for day use mooring spaces within the harbor is also included.

Your comments concerning the findings and/or design alternatives are welcome. Should you wish to respond, please let me hear from you prior to March 20. Mail your comments to: OWEN AYRES & ASSOCIATES INC, 1789 Shawano Avenue, P.O. Box 3968, Green Bay, WI 54303, Attention: Vern Vandenberg. I may also be reached at 497-1541 to respond to your questions.

Yours truly,

OWEN AYRES & ASSOCIATES INC

Vern Vandenberg

Vern Vandenberg, P.E.
Project Engineer

VV/aw

Enc.

LETTER SENT REGARDING BAYSHORE PARK

DATED 3/9/81 SENT TO THE FOLLOWING

Donald Holloway
Brown County Executive
Brown County Court House
100 South Jefferson Street
Green Bay, WI 54301

J. Roger Dernbach
County Board Chairman
251 East Mission Road
Green Bay, WI 54301

Cecil De Peau, Director
Brown County Park Commission
Northern Building
305 East Walnut Street
Green Bay, WI 54301

John Seefeldt
Brown County Harbor Commission
Northern Building
305 East Walnut Street
Green Bay, WI 54301

Paul Sager
University of Wisconsin-Green Bay
2420 Nicolet Drive
Green Bay, WI 54302

Les Raduenz, President
Brown County Boating Association
3439 Nicolet Drive
Green Bay, WI 54302

Commander
U. S. Coast Guard Station
Sturgeon Bay, WI 54235

Tom Conard
Conard's Mens Wear
1464 Main Street
Green Bay, WI 54302

Ben Laird, Chairman, Marina Committee
Green Bay Area Vistor & Convention Bureau
c/o Green Bay Broadcasting Company
225 North Adams Street
Green Bay, WI 54301

Jerry Van Den Wymelenberg
Downtowner Motel
321 South Washington Street
Green Bay, WI 54301

Ken Bukowski, Corporation Counsel
Brown County
Northern Building
305 East Walnut Street
Green Bay, WI 54301

Chet Miller
Park and Recreation Director
City of Green Bay
100 North Jefferson Street
Green Bay, WI 54301

Green Bay Area Chamber of Commerce
400 South Washington Street
Green Bay, WI 54301

Green Bay Area Visitor and Convention Bureau
1901 South Oneida Street
Green Bay, WI 54304

Gary Thompson
Green Bay Boating Club
c/o Form Systems and Services
P. O. Box 14
Green Bay, WI 54305

Brown County Board of Supervisors
c/o Ron De Lain, County Clerk
Brown County Court House
100 South Jefferson Street
Green Bay, WI 54301

B.F. Paruleski
Brown County Planning Commission
City Hall
100 North Jefferson Street
Green Bay, WI 54301

Robert Mundelius
Corps of Engineers
North Main Street
Kewaunee, WI 54216

Mike Casey
Brown County Shoreland Zoning
Northern Building
305 East Walnut Street
Green Bay, WI 54301

Letter Responses

Brown County Planning Commission

ROOM 608 • CITY HALL
100 NORTH JEFFERSON STREET
GREEN BAY • WISCONSIN • 54301
TELEPHONE 497-3633

March 17, 1981

Mr. Vern Vandenberg, P.E.
Project Engineer
Owen Ayres & Associates, Inc.
1789 Shawano Avenue
Green Bay, WI 54303

Dear Mr. Vandenberg:

I have reviewed the proposed expansion of Bay Shore County Park with respect to the harbor enlargement and wish to offer the following comments:

1. The report on present development and use of the harbor appears accurate.

2. We have no further information on projected demand for use for this harbor, adding the new DNR registration figures for 1980 (attached). Note that boat registrations in Brown County have increased +59 percent in the past ten years while our population has increased + 11 percent.

3. "Special Note #2" on the future continued use of Bay Shore Park facility even if the Bay Beach facility is developed is assured as a harbor of refuge and access point due to its spacing of about 15 miles easterly along the coast line from any future Bay Beach/ Fox River area facility. This spacing also would apply to a Suamico River based facility westerly of a future central facility.

4. "Special Note #3" regarding further expansion of Bay Shore Park Harbor, however, is questionable due to the probable high cost of such a large expansion compared with the allocation of boating funds more centered in the county.

The use of this harbor for access and as a harbor of refuge for this reach of coast line is important to eastern Brown County. This harbor is cost effective in terms of maintenance and its entrance should be improved to better control northeastern storm waves. However, due to the easternmost location in the county and due to the limitations of the access road, this harbor should not be enlarged to where it becomes the principal harbor in the county. The principal harbor/marina is now planned to be located adjacent to Bay Beach Park in the central part of the county, accessible to I-43 and to urban services. A doubling

or tripling of the size of Bay Shore Park Harbor would be diverting future financial resources away from a greater and more centrally needed harbor facility.

The adopted long-range comprehensive plan for Brown County recommends a major waterfront park along the Bay with a marina west of Bay Beach Park. Thus far, a 55 acre county island has already been constructed off-shore in a location especially planned to eventually serve as a harbor enclosure.

If I can offer more information, please call me.

Sincerely,

B.F. Paruleski, AICP
Planning Director

BFP:jmc

cc: Cecil Depeau, County Park Director

WISCONSIN BOAT REGISTRATION - 1980
BROWN, DOOR, AND OCONTO COUNTIES

	Outboards	Sail	Inboards	Totals
Brown County:				
Original (Individual)	12,826	447	326	
Fleet	66	11	1	
Totals	12,892 (94%)	458 (3%)	327 (3%)	13,677
Door County:				
Original (Individual)	2,290	143	181	
Fleet	308	37	7	
Totals:	2,598 (88%)	180 (6%)	188 (6%)	2,966
Oconto County:				
Original (Individual)	2,882	28	41	
Fleet	233	4	0	
Totals	3,115 (98%)	32 (1%)	41 (1%)	3,188

* *

RATE OF CHANGE: BROWN COUNTY AND WISCONSIN

	Brown County	%	Wisconsin	%
12/1970 Boats	8,589	+59	312,282	+24
12/1980 Boats	13,677		386,232	
1970 Population (Census)	158,244		4,417,933	
1980 Population (Prelim. Census)	175,470	+11	4,689,055	+6

SOURCE: Dale P. Morey, Supervisor of Boating Safety, Wisconsin DNR, 12/31/80

Compiled by the Green Bay-Brown County Planning Department, 3/1981
(Does not include large pleasure craft "documented" with the U.S. Coast Guard)

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Anthony S. Earl
Secretary

Box 3600
Green Bay, Wisconsin 54303

IN REPLY REFER TO: 3500

March 12, 1981

Mr. Vern Vandenberg
Owen Ayres and Associates, Inc.,
1789 Shawano Avenue
Green Bay, Wisconsin 54303

Dear Vern:

I have reviewed the Bayshore Park Harbor Development Plan-Preliminary report.

I believe the plan pretty well addresses those concerns that have been previously identified.

Once adopted, I would like to see the County apply for a single permit that would cover all phases of construction for at least the next ten years. This approach would reduce paper work from both us and the County.

Thanks for the opportunity to review the proposal.

Thank you.

Sincerely,

Ronald L. Fassbender
Water Management Coordinator

RLF:ip

BROWN COUNTY BOARD OF HARBOR COMMISSIONERS
The PORT of GREEN BAY, WISCONSIN
NORTHERN BUILDING
Telephone 414 - 497-3265

PORT DIRECTOR
JOHN A SEEFELDT

MAILING ADDRESS
COURT HOUSE
GREEN BAY, WI 54301

March 17, 1981 B-15.6b

Mr. Vern Vandenberg, P.E.
OWEN AYRES & ASSOCIATES INC.
1789 Shawano Ave
P.O. Box 3968
Green Bay, WI 54303

Dear Mr. Vandenberg:

I have reviewed the data sheet and various alternatives for the Bay Shore Park Marina.

I feel Alternative I would be the best plan. It would provide adequate protection for the interior marina area.

You might want to add a bin wall directly across from the end of the 160' extension. This would negate any resurge action that could result from a northwest storm.

Sincerely,

JOHN A. SEEFELDT
Port Director

JAS:mz

BROWN COUNTY BOATING ASSOCIATION

box 3535
green bay , wis. 54303

March 23, 1981

Mr. Vern Vandenberg, P.E.
Owen Ayres & Assoc. Inc.
1789 Shawano Ave.
Green Bay, Wis. 54303

Re: Bayshore Park

Mr. Vandenberg,

The following comments are in response to your inquiry regarding Bayshore Park and the proposed expansion.

1. The present faciility is inadequate as a harbor of refuge, because of severe wave turbulence penetrating the harbor.

2. The existing harbor , and any expansion, must resolve the problem of wave refraction inside the harbor.

3. The harbor, or a portion of the harbor, should be available for single overnight use on a fee basis. The site is too distant and exposed to permit safe round trip day passages from other launching points and marinas on the lower bay. Thi s is an important item to the long term use of the facility. The severe slope of the roadway down to the ramps, restricts use by many boat owners with trailable boats. This factor will become more evident as cars become smaller.

4. Some type of floating pier or cantilevered walkway along the inside face of the outer breakwall would help provide needed temporary fending off space for boats waiting to pull out.

Sincerely,

Les Raduenz
President